

ANGLE ADJUSTMENT STRUCTURE FOR ELECTRONIC APPARATUS HAVING DISPLAY UNIT

FIELD OF THE INVENTION

5 The present invention relates generally to an angle adjustment structure of an electronic apparatus having a display unit, and more particularly, to an angle adjustment structure such that the electronic apparatus, placed on a desktop, may form an adjustable inclination angle with the desktop such that the display unit may be viewed in its optimal viewing angle.

10 BACKGROUND OF THE INVENTION

In this epoch of the flourishing developments of computer information technology, all kinds of electronic apparatus has been developed and put on the market. For example, the conventional desktop computer, which separates the mainframe and the display unit and occupies a lot of space, has evolved to notebook computers that integrate the mainframe and the display unit into one entity by a folding mechanism. This allows the display unit contained in the upper case to close up with the mainframe contained in the lower case. Thus, the occupation space is reduced and the portability is enhanced.

On the other hand, many other electronic apparatus with a display unit are also developed and put on the market. The design of the electronic products described above mostly focuses 20 on its portability, convenience and the compact size. However, as shown in FIG. 1, such electronic apparatus are mostly operated by holding them in hand but not by placing them on a desktop with an optimal viewing inclination angle. Recently, a newly developed computer, generally called a Tablet PC, is going on market. The appearance of such Tablet PC is quite similar to that of the personal data assistant (PDA), however, its bulk size and display unit is 25 obviously much larger. While operating the Tablet PC, one may hold it in one hand and use an EMR pen to perform desired selections. Although, it has the advantages of convenience,

portability, and usability, most of people would not afford holding a Tablet PC for a long period of time. Thus, placing a Tablet PC on a desktop to use for a longer period of time is more compliant to the human factor. However, since the appearance of a Tablet PC is mostly in a shape of a flat thin board, there is no structure for supporting the Tablet PC to make an 5 inclination angle with the desktop on which the Tablet PC is placed. The display unit, thus, may not be viewed in the best angle. In addition, since nowadays the display unit of an electronic apparatus is mostly made of the TFT-LCD, the best viewing angle would be in perpendicular with the display unit. If the TFT-LCD is viewed in an inclined angle, the screen would become dimmer and the color would become worse.

10 According to the research done by the applicant, the electronic apparatus having a display unit and the latest Tablet PC, described above, no structure is provided for adjusting the inclination angle of the electronic apparatus placed on a desktop. As of today, many electronic apparatus having a display unit may only be operated by placing it on a desktop but not in an optimal viewing angle. This is in fact a generally existed defect in the structure and 15 the function of the electronic apparatus having a display unit, it is thus necessary to improve such a defect.

SUMMARY OF THE INVENTION

One objective of the present invention is to provide an angle adjustment structure of an 20 electronic apparatus having a display unit, such that, when the electronic apparatus is put on a desktop, the display unit may be adjusted to an optimal viewing angle to increase comfort.

Another objective of the present invention is to provide an angle adjustment structure of an electronic apparatus having a display unit, such that, by viewing in perpendicular to the display unit, the best resolution and color effect may be viewed.

25 The angle adjustment structure of an electronic apparatus having a display unit of the present invention, wherein a shaft hole mount is configured on the inner side wall of the case

shell of the electronic apparatus having a display unit. Along the hollow hole of the shaft hole mount, a rotation axle is firmly connected through the hollow hole. Inside the rotation axle, a hollow hole is configured and contains an axle center. And along the outer rim of the axle center circumference a plurality of axle ribs is configured extending to the inner wall rim of the rotation axle. The above mentioned axle ribs containing in the rotation axle divides a plurality of connection holes. The connection pawl at one end of the rotation pole is inserted through the hollow hole at one side of the case shell of the electronic apparatus and connected thereon. Rotationally connect the connection pawl together with the rotation axle into the shaft hole mount, so that the rotation pole may rotationally adjust the inclination angle of the case shell of the electronic apparatus supported on a desktop. A connection part is contained in the shaft hole mount, wherein a supporting foil is contained for producing an elastic suppression force. The curved portion at the center of the supporting foil may lock in the locking groove formed on the corresponding rotation axle. When the rotation axle adjusts angle together with the rotation pole, the curved portion of the supporting foil is locked in the rotation axle producing a proper locking force. The rotation axle may thus produce a rotation resistance and firmly affixed in one configured inclination angle.

The supporting foil contained in the connection part of the shaft hole mount is comprised of some proper elastic material. At the center of the supporting foil, a curved portion of triangular cone is formed. The curved portion of the supporting foil, corresponding to the rotation axle, according to the inclination angle of the rotation pole, a plurality of locking groove is formed. When the rotation axle connected on one end of the rotation pole rotates to the inclination angle described above, the curved portion of the supporting foil may lock in the locking groove of the rotation axle. By the locking force generated from the curved portion and the locking groove, the rotation pole may experience a rotation resistance and firmly affixed in one inclination angle. One end of the rotation pole may support the electronic apparatus on a desktop forming an inclination angle as described above. Therefore,

the display unit on the electronic apparatus may maintain a perpendicular viewing angle relative to the user.

BRIEF DESCRIPTION OF THE DRAWINGS

5 FIG. 1 (PRIOR ART) is a schematic diagram showing a conventional electronic apparatus having a display unit;

FIG. 2 is a structurally dissected view of an angle adjustment structure according to the present invention;

10 FIG. 3 is a perspective view showing a part of the angle adjustment structure according to the present invention;

FIG. 4 is a cross-sectional view of a shaft hole mount of the angle adjustment structure according to the present invention;

FIG. 5 is a structurally dissected view of a rotation pole of the angle adjustment structure according to the present invention; and

15 FIG. 6 is a schematic diagram showing an operational status of an electronic apparatus having the angle adjustment structure according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In order to understand further the particular features and functions of the present 20 invention, the detailed descriptions of which in accompany with the appended drawings are given in the following.

Please refer to FIG. 2 and FIG. 5, the angle adjustment structure of an electronic apparatus having a display unit of the present invention includes: a shaft hole mount 101 configured at the inner side wall of the case shell 100 of the electronic apparatus, a shaft hole 25 101a formed for axle connection at the center of the shaft hole mount 101, a connection part 101b configured at the bottom of the shaft hole mount 101 for locking a connection element;

a rotation axle 102 configured inside the shaft hole 101a of the shaft hole mount 101 described above, a plurality of locking grooves 102a configured at the circumference outside rim of the rotation axle 102 according to the selected inclination angle; a connection pawl 103 formed at one end of a rotation pole 104, the rotation pole 104 connected with the 5 rotation axle 102 via the connection pawl 103, the rotation pole 104 rotationally connected in the shaft hole mount 104; and a supporting foil 105 configured in the connection part of the shaft hole mount, a triangular cone like curved portion 105 formed on the supporting foil 105 at a position corresponding to the position of the locking groove 102 of the rotation axle; by 10 using the rotation pole 104 to select a desired inclination angle, the shell case 100 of the electronic apparatus positioned and supported on a desktop by the rotation pole 104 to make a best viewing angle.

The shaft hole mount 101 is formed with an arc-shaped shaft support 101c having the shaft hole 101a for axial connection. The connection part 101b is formed at the bottom of the shaft support 101c, and has a guiding hole 101d at each end thereof for allowing a connection 15 element 107 to penetrate through the guiding holes 101d. A basis mount 106 is formed on the connection part 101b of the shaft hole mount 101 corresponding to the inner side wall of the case shell 100. A connection hole 106a is formed on the basis mount 106 perpendicularly corresponding to each guiding hole 101d of the connection part 101b, and can be coupled by the connection element 107 penetrating through the guiding holes 101d, so as to allow the 20 shaft hole mount 101 to be firmly connected with the basis mount 106, as shown in FIG. 3. The connection element 107 can be a screw, and the connection hole 106a can be a screw hole.

A shaft hole 101a is formed at the center of the shaft support 101c of the shaft hole mount 101, as described above, to provide a rotation axle 102 rotationally configured in and 25 integrated with the shaft hole 101a. The shaft hole mount 101 is configured in the groove hole 101b of the shaft hole 101a and the groove hole at both ends of the concave groove 101g.

The groove hole 101f may contain a supporting foil 101 and the two bent portions 105b of the supporting foil 105 is embedded in the concave groove 101g. The center of the supporting foil 105 may thus, as shown in FIG. 4, be supported in the bottom rim portion of the groove hole 101f of the connection part 101b by a proper gap formed between the two ends of the 5 bent portion 105b. The center of the supporting foil 105 forms a triangular curved portion 105a. A locking groove 102a is formed, corresponding to the curved portion 101a of the supporting foil 105, at the circumference outside rim of the rotational axle 102 contained in the shaft hole mount 101. The locking groove 102a is configured at the circumference outside 10 rim of the rotation axle 102 according to the selected inclination angle. When the curved portion 105a of the supporting foil 105 is locked in the locking groove 102a of the rotation axle 102, the curved portion of the supporting foil 105a then produces a locking force against the locking groove 102a. Thus, the rotation axle 102 may not rotate in the shaft hole 101a of the shaft hole mount 101a by the locking force.

As shown in FIG. 2, a hollow hole 100a is formed at the rotation axle 102 contained in 15 the shaft hole 101a of the shaft hole mount 101 corresponding to the side wall of the case shell 100 of the electronic apparatus. The hollow hole 100a may provide the connection pawl 103 formed on one end of the rotation pole 104 to insert therein and connect with the rotation axle 102. Please refer to FIG. 4 at the same time, the internal part of the rotation axle 102 forms a hollow hole 102c and contains an axle center 102b therein. A plurality of axle ribs 20 102d is hollowly configured along the outer rim of the axle center 102b relatively extended from the outside wall of the hollow hole 102c of the rotation axle 102. This provides the connection pawl 103 at one end of the rotation pole 104 to insert into and to integrate with the connection hole 102e. As shown in FIG. 4 and FIG. 5, a through hole 103a is configured on the connection pawl 103 connected with the rotation pole 104, while a connection hole 102f 25 not penetrated is configured on the rotation axle 103 connected on the rotation pole 104. By using the through hole 103a of the connection pawl 103, a connection element 107 is inserted

and locked on the connection hole 102f of the axle center 102b. The connection element in this preferred embodiment may be a screw and the corresponding connection hole 102f may be a screw hole. The rotation pole 104 is then connected on the rotation axle 102 along the shaft hole mount 101 capable of rotationally swinging.

- 5 The rotation axle 102 contained in the shaft hole mount 101 may configure some locking grooves 102a around the circumference outside rim of the rotation axle 102 according to the desired six inclination angles. The locking groove 102a contained in the connection part 101b of the shaft hole mount 101 is locked by the curved portion 105a of the supporting foil 105. By the locking force due to the supporting foil 105, the rotation axle 102 is not capable of 10 rotating. Therefore, the rotation pole 104 connected with one end of the rotation axle 102 may then maintain a fixed inclination angle supporting the case shell 100 of the electronic apparatus be positioned in that particular inclination angle. However, the supporting foil 105 described above is comprised of an elastic material, the user may apply some proper rotation force on the rotation pole 104 to adjust the rotation angle of the rotation pole 104. The 15 supporting foil 105 is suppressed by the rotational force from the locking groove 102a of the rotation axle 102. The curved portion 105a of the supporting foil 105 thus affords the suppression force such that center portion of the supporting foil 105 is deformed downward and thus induced a displacement. Since the curved portion 105a is displaced downward, it is released from the locking position of the locking groove 102a of the rotation axle 102. The 20 rotation pole 104 may thus rotationally adjust the inclination angle of the supported case shell 100 of the electronic apparatus. Or, as shown in FIG. 6, the rotation pole 104 may be withdrawn and configured to one side of the case shell of the electronic apparatus such that the rotation pole 104 will not be touched while holding the case shell of the electronic apparatus by hand.
- 25 As shown in FIG. 5, the rotation pole 104, described above, is composed of a jacker board 104a in connection with a body board 104b, wherein one end of the board 104b is connected

with connection pawl 103. A plurality of pawl portion 103b is formed on the connection pawl 103 each penetrating through the connection hole 102e of the rotation axle 102 to produce a clamping force. A groove hole 104c is configured relative to another end of the body board 104b providing the first locking piece 108 clamped between the jacket board 104a and the 5 body board 104b to penetrate therethrough. A connection lock 104d is configured along both sides of the groove hole 104c on the body board 104b to connect with the first locking piece 108 penetrated through the groove hole 104c. A groove hole 100b (shown in FIG. 2) is configured on the first locking piece 108 relative to the side wall of the case shell 100 of the electronic apparatus providing the second locking piece 109 in the case shell 100 to penetrate 10 therethrough. The first locking piece 108 and the second locking piece 109 may be composed of a magnetic material. When the jacket board 104a is connected with the body board 104b to form the rotation pole 104, wherein the first locking piece 108 is clamped in the gap between the jacket board 104a and the body board 104b, the first locking piece 108 is penetrated through the groove hole 104c of the body board 104b. When the rotation pole 104 is 15 rotationally affixed by the side portion of the case shell 100 of the electronic apparatus, the first locking piece 108 interconnects with the second locking piece 109 penetrated through the groove hole 100b at one side of the case shell 100 of the electronic apparatus. By the attractive magnetic force, the first locking piece 108 and the second locking piece 109 are interconnected with each other. The rotation pole 104 may thus firmly affixed at the side wall 20 of the case shell 100 of the electronic apparatus without loosening.

As disclosed in FIG. 6, the angle adjustment structure of an electronic apparatus having a display unit of the present invention is in its in-use state. When a user wishes to position and operate the electronic apparatus on a desktop, the rotation pole 104 may be rotated away from the side portion of the case shell 100 of the electronic apparatus and adjusted to a selected 25 inclination angle. The curved portion 105a of the supporting foil 105 in the locking groove 102a may be locked into the locking groove 102a of the rotation axle 102 forming a fixed

inclination angle between the rotation pole 104 and the case shell 100 of the electronic apparatus. The user may feel that the hand holding rotation pole 104 stops at some certain angles. The case shell 100 of the electronic apparatus may thus be supported to form some certain inclination angle with the desktop while positioned on the desktop. Therefore, the user

5 may view the display unit with an optimal viewing angle to obtain the best viewing quality.

The rotation pole 104 described above may rotate to an inclination angle relative the plurality of connection grooves 102a on the rotation axle 102. The rotation pole 104 may then be adjusted depending on the user's built or the height of the desktop so that the case shell 100 of the electronic apparatus is supported by the rotation pole 104 with the best viewing

10 angle. When finished operating the electronic apparatus, the user may slightly apply some force on the rotation pole 104 deforming the supporting foil 105 in the shaft hole mount 101 by the force on the rotation axle 102. The curved portion 105a of the supporting foil 105 is then released from the locking position of the locking groove 102a of the rotation axle 102. The rotation pole 104 is then rotated and withdrawn to the side wall of the case shell 100 of

15 the electronic apparatus. The first locking piece 108 on the rotation pole 104 is locked on the second locking piece 109 on the case shell 100 of the electronic apparatus by an attractive magnetic force. The rotation pole 104 is thus affixed at the side portion of the case shell 100 of the electronic apparatus without loosening. At the same time, since some charging plug or the audio signal input plug may be distributed at the side portion of the case shell 100 of the

20 electronic apparatus, a shielding effect may be induced to prevent unwanted objects from entering into the plugs by affixing the rotation pole 104 beside the side portion of the case shell 100 of the electronic apparatus.

The present invention described above is only to illustrate a preferred embodiment but not to limit the applicable scope of the present invention. Any equivalent alteration or

25 modification of those skilled in the art without deviating from the principle or spirit of the present invention, for example, connecting the rotation pole at the back portion of the case

shell of the electronic apparatus, is considered within the scope of the present invention as defined in the following claims.